Curriculum Vitae
Eduardo Enrique López Atencio

Contact Information

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Citizenship: Venezuelan
Languages: English, Spanish

Research Interests

- Flow in complex networks and lattices: Tracer flows in percolation and exponential disorder, with applications to oil extraction problems. Physical flows in random and scale-free networks with an interest in their applicability to real-world problems such as infectious disease propagation, metabolic network fluxes, and Internet data flow.

- The study of structural properties of complex networks: Construction of data based networks of technological and biological problems. Study of network properties such as degree distribution, clustering properties, link weight distribution, community identification, degree-degree correlations, etc.

- Effect of disorder on optimization problems in complex networks and lattices: Fractal properties of optimal path lengths in broadly disordered systems, and their applications to transport problems such as flow through porous rocks, data flow through the Internet and metabolic fluxes on metabolic networks. Calculations of optimal flow costs.

- Surface growth dynamics: Behavior of a crystalline growing interface in the presence of long-range interactions. Highly disordered soliton gases.

Academic Background

- **Undergraduate Studies:** December, 1995. Licenciado en Física, Universidad del Zulia, Maracaibo, Venezuela. Graduated Summa Cum Laude (first ever awarded to a Physics graduate at this institution).

- **Graduate Studies:** January 2000. Master of Arts in Physics, Boston University, Boston, Massachusetts, United States.
- **Graduate Studies:** May 2005. PhD, Boston University, Boston, Massachusetts, United States.

Relevant Skills

- Mathematical Tools for the study of Physical Systems.
- Computational Tools.
- Expertise in Numerical Methods.
- Knowledge of US National Security issues, including health and infectious diseases threats.

Professional Experience

Teaching

1. Faculty member. Boston University Academy. 9/2000 to 6/2001
2. Faculty member. University of Zulia. 4/96 to 12/02
3. Teaching Fellow. Boston University 9/97-7/00 and 9/2001-5/2003
4. Interim Professor. University of Zulia 1/96-4/96
5. Teaching Assistant. University of Zulia 7/93-9/94

Research

- Postdoctoral Fellow. Theoretical Division. Los Alamos National Laboratory. 4/05 to present.
- Research Assistant. Center for Polymer Studies. Boston University. 9/98 to 4/05
- Interim Professor. University of Zulia 1/96-8/97
- Visiting Collaborator. Computational Physics Laboratory. 11/95-5/97 Instituto Venezolano de Investigaciones Científicas (IVIC) [Venezuelan Institute for Scientific Research]
- Research Assistant. Computational Physics Laboratory. IVIC 9/94-11/95

Awards & Affiliations

- First ever Summa Cum Laude graduate of the Physics Department at University of Zulia.
- Teaching Fellow of the year award, voted by the Faculty of the Department of Physics of Boston University, for excellence in teaching for the academic year 2002-2003.
- Award from the Experimental College of Science, for achieving the highest GPA in the Physics program in Physics in 1994.
- MARAVEN Award to Academic Excellence, for attaining the highest GPA in 1993 in the Experimental College of Science. MARAVEN was a subsidiary of Venezuelan oil company PDVSA.
- Simón Rodríguez Award, for attaining the highest GPA in the Experimental College of Science. Two times: 1990 and 1993
- Honor Roll of the University of Zulia, for attaining one of the 10 highest GPA at Experimental College of Science. Obtained from 1990 to 1993
- Member of the American Physical Society 2005.
- Member of the Venezuelan Physical Society. 1995-present

Publications

1. "Transport of multiple users in complex networks", S. Carmi, Z. Wu, E. López, S. Havlin, and H. E. Stanley, accepted for publication in Physica A (cond-mat/0609031).
2. "Anomalous electrical and frictionless flow conductance in complex networks", E. López, S. Carmi, S. Havlin, S. V. Buldyrev, and H. E. Stanley, accepted for publication in Physica D (2006).
3. "Optimal Paths and Minimal Spanning Tress in Random Weighted Networks". L. A. Braunstein, Z. Wu, Y. Chen, S. V. Buldyrev, S. Sreenivasan, T. Kalisky, R. Cohen, E. López, S. Havlin, and H. E. Stanley, accepted to the International Journal of Bifurcation and Chaos (cond-mat/0606338).
4. "Topological Limits on Network Communications". Sameet Sreenivasan, Reuven Cohen, Eduardo López, Zoltan Toroczkai, and H. E. Stanley, Submitted to Phys. Rev. Lett. (cs.NI/0604023).
5. "Universal behavior of optimal paths in weighted networks with general disorder". Yiping Chen, Eduardo López, Shlomo Havlin, and H. Eugene Stanley. Phys. Rev. Lett. **96**, 068702 (2006) (cond-mat/0508759).

6. "Possible connection between the optimal path and flow in percolation clusters". Eduardo López, Sergey V. Buldyrev, Lidia A. Braunstein, Shlomo Havlin, and H. Eugene Stanley. Phys. Rev. E **72**, 056131 (2005).

7. "Anomalous Transport in Complex Networks". Eduardo López, Sergey V. Buldyrev, Shlomo Havlin, and H. Eugene Stanley. Phys. Rev. Lett. **94**, 248701 (2005).

8. "Current Flow in Random Resistor Networks: The role of Percolation in Weak and Strong Disorder" Zhenhua Wu, Eduardo López, Lidia Braunstein, Sergey V. Buldyrev, Shlomo Havlin, and H. Eugene Stanley. Phys. Rev. E **71**, 045101 (2005).

9. "Universality of the optimal path in the strong disorder limit". Sergey V. Buldyrev, Shlomo Havlin, Eduardo López, and H. Eugene Stanley, Phys. Rev. E **70** 035102 (2004).

10. "Post-breakthrough Behavior in Flow through Porous Media". Eduardo López, Sergey V. Buldyrev, Nikolay V. Dokholyan, Leo Goldmakher, Shlomo Havlin, Peter R. King, and H. Eugene Stanley, Phys. Rev. E **67**, 056314 (2003).

11. "Using percolation theory to predict oil field performance" Peter R. King, Sergey V. Buldyrev, Nikolay V. Dokholyan, Shlomo Havlin, Eduardo López E, Gerry Paul, and H. Eugene Stanley, Phys. A **314**(1-4), 103 (2002).

12. "Uncertainty in oil production predicted by percolation theory". Peter R. King, Sergey V. Buldyrev, Nikolay V. Dokholyan, Shlomo Havlin, Eduardo López E, Gerry Paul, and H. Eugene Stanley, Phys. A **306**(1-4), 376 (2002).

13. "Topological Defects with Long-Range Interactions". B. A. Mello, Jorge A. González, Luis E. Guerrero, and Eduardo López-Atencio, Phys. Lett. A **244**(4), 277 (1998).

14. "Long-Range Self-Affine Correlations in a Random Soliton Gas". Luis E. Guerrero, Eduardo López-Atencio, and Jorge A. González, Phys. Rev. E **55**(6), 7691 (1997).

Book Chapters

1. S. Havlin, E. López, S. V. Buldyrev, and H. E. Stanley, "Anomalous Conductance and Diffusion in Complex Networks," 4.1-4.11 in *Diffusion Fundamentals Vol. 2*, eds. Jörg Kärger, Farida Grinberg, Paul Heitjan (Leipziger Universitätsverlag, Leipzig) (2005).

Other Publications

1. "Physics of flow in random media". Eduardo López. Ph. D. Thesis, Boston University, 2004.

2. "Performing the Cavendish Experiment". Eduardo López, Jason St. John, and B. Lee Roberts. Currently used lab manual for the Cavendish experiment at the Physics Department at Boston University.

3. "Transición al orden fractal en un sistema aleatorio tipo seno de Gordon" (*Transition to fractal order in a random sine-Gordon system*). Eduardo López. Undergraduate thesis, Universidad del Zulia, Maracaibo, Venezuela, 1995.

Articles under preparation

1. "Distributions of the optimal path and its cost in strong and weak disorder". E. López, J. C. Miller, Y. Chen.

2. "Flow on gradient networks". L. A. Braunstein, E. ópez, P. A. Macri, and Z. Toroczkai.

3. "Scale-free gradient networks". A. Clauset, C. Moore, E. López, and Z. Toroczkai.

4. "Structural Properties of gradient networks". E. López and Z. Toroczkai.

Media Interviews

- Interview by Esmeralda Stuk for The Daily Free Press, appearing in the 3/15/04 issue for the article "6 degrees of Kevin Bacon game real, says BU study".
http://www.dailyfreepress.com/news/2004/03/15/News/6.Degrees.Of.Kevin.Bacon.Game.Real.Says.Bu.Study-633462.shtml

Distinguished Colloquia and Presentations at Conferences

- "Flow in Random Networks". Invited talk for colloquium series at Emory University. Atlanta, Georgia, September 2006.

- "Transport on complex networks". Invited talk, Max Planck Institute for Complex Systems. Dresden, Germany, February 2006.

- "Physics of flow in random media". Invited talk, Institute for Scientific Interchange. Torino, Italy, February 2006.

- "Transport on complex networks". Eduardo López, APS March meeting 2005.

- "Flow in Percolation Clusters: Post-breakthrough behavior". Eduardo López, STATPHYS 21, Cancún, México, 2001.

- "Long Range Correlations in a Random sine-Gordon chain". Eduardo López Atencio; Luis E. Guerrero; Jorge A. González, Contributed work to the XLV Annual AsoVAC (Asociación Venezolana para el Avance de la Ciencia) Convention 1995. Caracas, Venezuela

References

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2. Shlomo Havlin
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   Director, Minerva Center and Department of Physics
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   Center for Petroleum Science, TH Huxley School
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